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Please stand by for realtime captions.

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The conference will begin momentarily. Thank you for standing by, ladies and gentlemen.

[Pause]

Please stand by for realtime captions.

Ladies and gentlemen, thank you for standing by. The conference will begin momentarily. S.

Ladies and gentlemen, thank you for standing by. Welcome to the transportation planning information exchange. At this time all participants are in a listen-only mode. Later we'll conduct a question-and-answer session. Instructions will be begin at that time. If you should require assistance during the call, please press star 0. I would now like to turn the conference over to your host, Jackie Jenkins. Please go ahead.

Good afternoon, and good morning to everyone. Welcome to this year's first transportation information planning exchange webinar. In discussion will be on estimating transportation greenhouse gases for integration into the planning process. My name is Jackie Jenkins and I will be today's facilitator. This is an inter active session. I ask that you please send in your questions or comments via the chat pod which is located on the left hand corner of your screen or direct your questions to our telephone operator, Vicki. My role is to monitor the screen for incoming questions. So please send them to me. Shortly, I will turn the session over to Diane Turchetta, our moderator, and one of our subject matter experts in the FHWA office of natural environment. She will state why we are here and introduce the presenters. Just also want to share with you that Joey is the project manager for the greenhouse gas handbook. But now I'd like to share useful tips to ensure a smooth-running session and reduce or eliminate background noise. First, please use a land line if possible to connect to avoid unnecessary static. Second, when not speaking, mute your phones and third, turn off the volume on your computer. Speaker PowerPoint presentations will be uploaded, the webinar will be recorded and both an audio recording and closed captioning transcript will be shared on our website at www.planning.dot.gov. Please allow two to three weeks for availability. So please keep me busy, sending your questions or comments. Thank you so much for your participation and interest. And now here is Diane.

Thank you, Jackie. What we're doing here today is providing information to state and local transportation agencies on how to do a greenhouse gas analysis, what data to look at, what tools to use, various methodology and we're going to do that by walking through to some extent a product developed here at the Federal Highway Administration "Handbook for Estimating Transportation Greenhouse Gases for Integration into the Planning Process."

[Pause]

So I'd like to turn it over to Ken Petty now who is going to give some introductory remarks.

Thanks, Diane. As mentioned, today's webinar is on estimating transportation greenhouse gas for integration into the planning process. Although federal regulation do not require analyzing GHG emissions as part of the statewide planning, many actions tend to address GHG emissions and can initiated at the state or regional level. Considerations can be incorporated into the transportation process. Presenters will provide background and status practices for estimating transportation greenhouse gases. We're hearing more technical overview of several tools and methods being used to analyze GHG in the planning process. The Executive Director for transportation council, sorry, Rich, if I say that wrong, will provide highlights and information from the metropolitan planning and organization perspective for estimating transportation greenhouse gases at the regional level and hear about other tools they will have to use in the GHG process. I'm Ken Petty the acting director for the FHWA office of planning but before we go into the webinar, myself and Dwayne Weeks have some updates to give on behalf of FHWA and FTA. In terms of FHWA, the omb recently published its final guidance entitled [indiscernible] [Extremely fast speaker] Also known as 2 CFR 200. This model guidance supersedes streamlines requirements not only from the various OMB circulars but also regulations identified in the current 2 CFR series. The office of the secretary and the office of -- and the fhw office of financial management programs are working to develop guidance on the department's implementation.

I will let Dwayne speak on behalf of the planning group. And so he will do that as part of his spiel. In terms of other efforts in the 2014 announcement is available. The fhw is looking to advance planning to advance the practice and application of the transportation planning among state MOPs regional local and tribal transportation planning governments in response to significant changes in the planning process and to identify new tools, techniques and approaches that respond to national transportation planning priorities. Please note the [indiscernible] Will consist of two phases preproposal and [indiscernible] To apply applicants go to [indiscernible] .gov for more information. Look for a solicitation number dtfh414r0019 which closes on April 23, 2014.

Also, the office of planning environment realty and, uhm, highway policy information have agreed to waive the nonfederal matching requirement for SDNR funding for -- to support performance management data collection and reporting. We encourage state DOTs and MPOs to continue working cooperative to ensure that urbanized boundaries have been adjusted to reflect new expanding UVAs in their future submissions. If you have questions regarding this waiver, please contact Laurie or Chris Allen.

The US DOT announced $600 million will be made available to fund transportation projects across the country. Around the highly successful competitive grant program. Tiger investments help respond to the opportunity to instill strong transportation system that connects America's -- Americans with better -- with a better way of life. The Tiger 2014 grant program will place emphasis on projects that support reliable safe and affordable safe transportation options that improve connections for both urban and rural communities also making it easier for residents to reach work, school and other ladders of opportunity.

For more information please visit www.dot.gov/Tiger.

That's it for my update. Now turn it over to Dwayne.

Thanks, Ken. My name is Dwayne I'm the director of office of planning methods with the Federal Transit Administration office of planning and environment. New and upcoming events from the Federal Transit Administration. We anticipate publishing the fiscal year 2014 apportionment notice with all of our funding allocations in the very near future. Keep your eyes on our website for the update of the fy2014 apportionments. Frequently asked questions and additional program guidance for major capital investments program as an interim method until we can advance with the notice proposed rulemaking.

Regarding implementation of the planning provisions about moving ahead America progress in the 21st century or MAP 21, we're currently working on a final guidance on transit agency representation on MPO board and how they can work together to implement the provisions. Comment period closed on October 30. We looked at all the comments and revised the policy guidance and we're circulating it through the system and we expect to have something available posted soon to the website in a joint FTA/FHWA guidance on a transit agency and representation on boards. We are also working with the Federal Highway Administration with pro mosted rulemaking among metropolitan and statewide planning that reflects a MAP 21 emphasis area on a performance-based planning and we hope to have that published in

the spring of this year.

In addition, there's the performance management framework in MAP 21 and we have been working on a series of different events on the transit side. There was an advance notice proposal -- national public transportation safety plan. The public transportation safety certification program. The 90-day comment period closed on January 2. We received 150-plus submissions and an awful lot of comments on the 123 questions. We are going to be working on separate independent notice proposed rule makings on transit asset management and safety on the safety agency plan the public transportation safety certification training program and safety Management Systems among others. So again keep your eye on the website. These will be made available hopefully in the spring of this year. And that's pretty much what I had from FTA.

Turn it back over to Diane.

Thank you, Ken. Let's -- before I get started, I just wanted to go over what the webinar agenda will look like. There was a presentation here that's not --

[Pause]

Let me formally introduce our speakers. Myself, I'm Diane Turchetta and I'll be the moderator with the Federal Highway office of natural environments sustainable transport and chronic change team. We'll have Jeff Houk who is an air quality engineer from the Federal Highway Administration resource center. The air quality team located in Lakewood, Colorado. Rich parents Executive Director Genese transportation council Rochester, New York. My colleague John Davies an environmental protection specialist in the office of natural environment on the sustainable transport and climate change team.

I'm going to provide a very short overview of the handbook and and I think Ken only mentioned what our speakers will be addressing in his opening remarks. Then we'll have a little summary and open it up for q and q and a.

In terms of the handbook itself and the need for it, there's been really a growing interest in analyzing greenhouse gas emissions in transportation planning and as Ken mentioned there is no federal requirement for state DOTs and MOPs to consider greenhouse gases in their transportation planning process but many are doing so for various reasons. Some have state and local laws or regulations that require them to do so. Some want to integrate greenhouse gas emissions into the performance-based planning and programming process. There are a lot of other reasons other than being required to do it that state and locals are interested in greenhouse gas analysis h.

The purpose of the handbook we are discussing today first of all of course the primary audience for this handbook is state DOTs and MPOs. The content of the handbook, the basically it lays out the methodologies tools and data sources that are commonly and typically used for greenhouse gas inventories to perform forecasts and analysis of greenhouse gas plans and mitigation strategies. And the book does -- the handbook does a very nice job of laying out this information and also provides some references at the end of some case studies that are very helpful for folks who are undertaking such an analysis.

One of the things we often want to promote is including greenhouse gas analysis in the transportation planning process with this webinar and the handbook is all about on the slide you're seeing right now is a diagram showing the key elements of the planning process. And it's really a diagram showing that climate change considerations should be really integrated into the planning process and not considered a separate topic or subject area. And in 2008 Federal Highway did a study entitled, integrating climate change into the transportation planning process that really takes a detailed look at how you do that and provide some really nice case studies of areas who have done it and have looked at their long-range transportation plans. So I encourage you to go on our Federal Highway climate change website and take a look at that report that's posted there for 2008.

I think one of the major reasons is long-range transportation plans are long range and looking at your transportation

investments and your decision-making over the years, you want to basically take into consideration your climate change what impacts climate change and your projects are going to have on climate change. It's important to make those informed decisions and consider climate change and other environmental issues that are under consideration.

Also, another reason we want to address climate change in the planning process is, you know, MAP 21 establishes 7 national goals for the Federal Highway program including environmental sustainability. As I mentioned before, states and MPOs may wish to include climate -- or greenhouse gases as a performance measure in their planning process in order to support the national goal of environmental sustainability.

Let me make it clear, there is no greenhouse gas performance goal but what we are saying is you may want to use that as one of the factors in your performance planning.

The other thing which I mentioned before is that, you know, a lot of state and locals have climate change action plans and different planning efforts going on. And greenhouse gas analysis in planning can really aid that information and the analysis can really inform decision-makers and various transportation decisions.

The other thing we often want to promote is basically integrating climate change and greenhouse gas analysis into the planning and environmental linkage efforts. As you know, most of you are probably familiar with the PEL process. Basically it's designed to do your planning, your planning -- let me take a step back. It's basically to address in the planning process an analysis that will be used in NEPA to avoid duplication and in some ways just make the NEPA process more streamlined and one of the things we really want to promote is the PEL approach for climate change considerations and we are looking for some MPOs and even state DOTs who are working on that aspect of PEL.

There's different types of analyses in the planning process and I think I mentioned this before. Basically, inventories, looking at your past and current emissions, forecasts looking at your future emissions, and, of course, strategy analysis looking at the facts and transportation strategies or sets of strategies. And John Davies will be talking about a tool that Federal Highway has called the energy and emissions reduction policy analysis tool that was developed for this purpose to analyze multiple greenhouse gas strategies almost as a screening tool so he will be discussing a little bit about that as one of the tools that Federal Highway has.

So you can take a look here at the screen at the handbook sections. I'm not going to go through each one of those. As I said in the beginning, there are some various approaches and methodologies, goes over data sources and really gets into the basics of your situation and whether you're looking -- what type of analysis you want to do and what kind of methodology you're looking at. And so to talk a little bit more about that, I want to turn this over to Jeff Houk and Jeff is going to talk about some of the specifics of the handbook in the tools and methodologies.

Thank you, Diane. I'm Jeff Houk with the resource center. I'm located in Lakewood, Colorado. I have been working on greenhouse gas analysis for quite a while now for Federal Highway Administration. I'm going to walk through the core content of the handbook and explain how the handbook is organized to help you decide on an analysis method for greenhouse gas analysis.

There are five basic methods for greenhouse gas analysis that are covered in the handbook. The two most common ones are fuel-based analysis and VMT-based analysis. In a fuel-based analysis, you estimate how much fuel is consumed in the transportation sector then estimate greenhouse gas emissions from that. Vmt, you start with vehicle miles traveled and apply emission factors to estimate greenhouse gas emissions. I'm going to talk about these in detail.

The handbook also covers three additional methods. Some alternative greenhouse gas estimation methods for analyzing different policies with the EERPAT model for specific transportation strategies such as land use or operation strategies, freight strategies and finally additional considerations for GHG analysis. Life cycle analysis or consideration of transportation construction and Mains nance emissions. So we'll talk about those.

The handbook is organized around this table that helps new users sort of figure out the best method for the type of analysis they want to conduct. There's this flow chart in the handbook that sort of walks through the different considerations in choosing an analysis methodology and there are two tables that go along with this. One table

summarizes these different methods and where they apply. Another table lays out some of the pros and cons of different methods. So there's a lot of information in the beginning of the handbook to help you get started and choose an analysis methodology that's going to give you the types of results you want with the most efficient use of your time and data.

This flow chart starts out with the goal of the analysis. Depending on the purpose, different methods are appropriate. You can conduct a greenhouse analysis to estimate an emissions inventory for a past year. You can conduct projections for future years. Or you can analyze different strategies. Each of those lends itself to different types of methods.

The geographic scope covered by the analysis also affects the analysis methodology. You might use one for state and a more refined method for local analysis.

The types of emissions and emissions sources that you need information for affect the choice of analysis methodology. And also, the level of precision. Are you interested in a highly detailed analysis to compare to other information about greenhouse gas emissions from other source categories or is this sort of a back of the envelope sketch planning approach where you want a rough idea of the scale of emissions from the transportation system?

The second group of considerations is what you have available. What data do you have available to, you know, characterize vehicle activity or emissions sources? What are your modeling capabilities? Do you already have, you know, a four-step model set up for your metropolitan area or is this an analysis for a rural area with no model and with very limited data?

And then finally what resources do you have available? How much time do you want to spend on this? Do you want to, you know, a complicated rigorous analysis or again sort of the back of the envelope analysis?

Finally what variables do you want to analyze? Are you interested in strategies that involve fuel and vehicle technology, more efficient vehicles or alternative fuel? Are you primarily interested in looking at the effects of travel demand strategies that affect vehicle travel? Or operations and speed factors? Making the existing transportation network more efficient. The type of strategies that you want to analyze also affect the tools that you use.

Then finally there are some cross-cutting factors that affect all of these including fuel prices which impact fuel consumptions, population and employment and other kinds of demographic factors.

So the handbook establishes this framework to help you select a method and then provides more detail to help narrow in on the best approach for your analysis and then it goes into specific detail on how these methods work. And that's what I'm going to talk about next.

So the first general category of analysis methodology is our fuel-based method. These are methods where you estimate the amount of fuel that's consumed in the transportation system apply an emissions factor to estimate total emissions. Typically, emission factors are only available for carbon dioxide. So you're estimating consumption of a carbo hydrogen fuel, you apply an emissions factor based on the amount of carbon in the fuel to estimate CO2 emissions. This is most applicable at the state level where fuel data are typically available. It's rare to find fuel consumption data at the metropolitan level or the County level or the city level but fuel sales data are widely available at the statewide level because they -- you know, they are accounted for in calculating gas tax revenues. One of the limitations is it's based on fuel consumption where the fuel is sold. That's how fuel consumption is measure. If you are in an area where there's a considerable amount of cross-border travel, people living in one state and commuting to another state, the fuel that's sold in your state may not reflect fuel burned in your state. So there are uncertainties with this method. Also, this is primarily an inventory method. It's difficult to project emissions. You're not accounting for transportation investments like building transits or new highway facilities.

Common sources of fuel consumption data includes state fuel sales data and projections, number of states have revenue models to help them predict gas tax revenues in the future. So you can use those to get an estimate of fuel sales in the future. Highway statistics include historical data on fuel consumption. The Energy Information

Administration part of the Department of Energy also produces a document called the annual energy outlook which includes past data by state on fuel consumption and also projections by state on fuel consumption.

To calculate emissions, apply emission factors, there are a number of sources for these including the Energy Information Administration, EPA, there's an EPA tool called state inventory tool and the state inventory projection tool which also includes emission factors based on fuel consumption.

Here's an examining of that from the energy transportation administration. You can see the different types of fuel on the left. The emission factors in kilograms of carbon dioxide generally per gallon of fuel. Or kilograms of carbon dioxide per BTU. One thing you will learn when starting a fuel-based analysis there are lots of conversion factors involved because some of the emission factors are emissions per gallon, others are emissions per barrel. You will have to convert it. Natural gas the emission factors are per 1,000 cubic feet or per btu. So you have to be able to calculate between different volumes of fuel or the energy content versus the volume of fuel in order to calculate emissions. And the handbook walks through this.

As an example of that, Vermont produced a statewide greenhouse gas emission inventory used a fuel-based method. They used EPA's state inventory software and also methods in EPA's emission inventory improvement program guidance. The state inventory tool has default fuel consumption data for each state. These are replaced with actual data for state tax data for state of Vermont. Vermont was also able to develop projection for future years using their own VMT projections plus fuel economy data from the Energy Information Administration. And also information on EPA's new vehicle greenhouse gas standards. So it's possible to use these fuel-based methods to generate statewide inventories. But again, there are limitations to the projections you can make because you're projecting future fuel consumption and that depends on a lot of things including fuel prices, fuel economy and changes you're making to the transportation system. And again you have the whole issue of cross-border travel. So fuel that's sold in your state may not necessarily reflect the fuel that's consumed in your state depending on commuter patterns, different state gas taxes and so on.

The next large category of methods are VMT-based methods. In a VMT-based method instead of estimating fuel consumption you're estimating vehicle miles traveled and applying an emission factor based on grams of emissions per mile of travel to estimate greenhouse gas emissions. This is what we have been doing for the last roughly 24 years for transportation conformity purposes. So this is a similar method to that used in transportation conformity for the national ambient air quality standards.

There are a wide range of levels of sophistication for this. If you have already been doing conformity for many years, a lot of these methods will seem relatively simplistic to you. However, not everybody has had a reason to do conformity. Many juries don't even have a travel demand model -- many areas don't even have a travel demand model so it covers the entire range of members from simple to sophisticated so the handbook is useful for areas with all levels of experience.

There are a wide range of methods for estimating vehicle miles traveled. Some very simple approaches include use of vehicle odometer data long with registration data. If you have been collecting data on vehicle miles traveled as part of an emissions inspection program or a registration program, that gives you miles per vehicle. Also, through your registration database you know the number of vehicles so you can calculate VMT. Household travel surveys often include information on vehicle miles traveled by vehicle or by household. You can also use land use data to estimate VMT. If you know the types of land use whether it's residential or retail, you can estimate the number of trips those land uses generate and the typical distance for those trips.

HPMS is a source of historical vehicle miles traveled data. The HPMS system has been around a long time. Most of you I'm sure are aware of some of the details and limitations with those data. But they provide a source of data for areas without travel models. HPMS data are also used as a control total in many areas that do have travel models. And then there are different ways that you can project future VMT if you have HPMS/VMT for a base year.

Finally travel models. Travel models are the go to source of vehicle miles traveled data in most areas that have them. They are validated for a base year and then used to project vehicle miles travel for future years so for most areas that

have been doing conformity, this will be their source of VMT data for greenhouse gas analysis, as well. If you have never had to do conformity but you do have a travel demand model, it still is a useful source of vehicle miles traveled data for greenhouse gas analysis.

By the way, to my other presenters, I'm looking at this on full screen. So I can't see what's going on in the chat pod. But if something does come up in the chat pod, just break in and let me know and I can answer that question.

Once you have an estimate of vehicle miles traveled you then apply an emission factor to estimate total emissions. There are simple factors available from different sources online. You can use look-up tables. , generate your own lookup table using models. I have also generated look-up tables for MPOs and other agencies to calculate greenhouse gas emissions. You can have lookup table for the count for fleet characteristics because passenger cars have different emission rates than trucks and so on. You can also account for vehicle speeds so if you have information for vehicle miles traveled by speed you can get emission rates that are also organized by speed. Finally there's EPA's moves model which allows you to calculate emission inventories or rates depending how you would like to approach estimating vehicle emissions. Moves is the current tool for estimating greenhouse gas gas emissions in the United States. It applies in all states except for California which has its own emissions factor model. Moves is an energy model and greenhouse gas model. It accounts for fleet information, road type, vehicle speed, and so on. Moves is the grace period for using moves for conformity has already expired so many MPOs are beginning to use moves for conformity. But it's also a greenhouse gas tool.

EPA issued a specific guidance document on using MOVES for greenhouse gas gas analysis and there's the link for that at the bottom of the page. It lays out both sophisticated and simple approaches for using the MOVES model as a greenhouse gas gas tool so even if you don't have any experience with the MOVES model at all and don't otherwise need to use it for other purposes, you can still use it for greenhouse gas analysis with the help of the EPA's guidance and the resource center technical service team for air quality also provides a lot of technical assistance to agencies around the country on using the MOVES model so we can help you get started with MOVES.

As an example of a VMT-based greenhouse gas analysis, this is for the Delaware valley MPO, they developed a regional greenhouse gas emission inventory using the travel model and HPMS to estimate vehicle miles traveled. Using their model they were also able to apportion VMT to different jurisdictions based on the trip origin, destinations and trip length. And then using that information, they could -- with VMT by jurisdiction, they could calculate emissions by jurisdiction and then map those emissions for different parts of the region. Some have higher greenhouse gas gas emissions per person than other parts of the region in the Delaware Valley.

Atlanta also conducted a VMT-based greenhouse gas analysis. They did it as part of a scenario planning exercise to look at the impacts of different future land use scenarios. So they can estimate vehicle miles traveled using their travel model and then estimate greenhouse gas emissions using the MOVES model so they can see how greenhouse gas emissions would look for these different scenarios. So in this case you can the future trend line and then the impacts of different possible future land use scenarios on greenhouse gas emissions in the region.

These slides will cover the remaining three approaches. For freight-related emissions, commodity flow methods are useful. Travel demand models are geared tore passenger traffic and less robust capability for estimating freight travel so commodity flow methods can be used to estimate freight-related emissions. We have also produced a tool called the energy and emissions reduction policy analysis tool or the EERPAT model. This allows states to estimate the impacts of different policies for reducing greenhouse gas emissions including pricing policies, fuel pricing policies, energy-efficient vehicles and electric vehicles, land use strategies and so on. EERPAT is a way to conduct a screening level analysis of a large range of strategies. And that tool has been available since last year.

In terms of analyzing specific strategies, many travel demand models don't have the ability to estimate emissions -- travel changes associated with sort of small scale greenhouse gas reduction strategies. So the handbook provides information on analyzing TDM strategies, land use strategies, TSM strategist and eco-driving and freight-related strategies. So the handbook walks through the methods for analyzing these types of individual strategies and also provides examples.

Finally, life cycle sources. Greenhouse gas emissions are different than many of the pollutants that we have analyzed in the past. We have been focused on localized air quality impacts related to the national ambient air quality standards so we're concerned about the emissions that are occurring within a given geographic area. Greenhouse gas emissions have cumulative impact. So emissions from vehicles using the roadway impacts climate but emissions from the concrete and steel that are used in roadways also affect the climate even though the concrete and steel are produced somewhere else. Emissions from construction equipment affect the climate. Emissions from maintaining roads affect the climate. So the impacts of the transportation system on greenhouse gas emissions and climate change go well beyond just the vehicles driving on the roadways. So life cycle methods help you get a handle on those sort of second tier impacts.

The handbook walks through different life cycle analysis associated with upstream emissions, associated with the fuel that powers the vehicles. For example, the emissions from producing gasoline and diesel that are later burned in vehicles and the electricity that's used in transit vehicles. The handbook also covers construction and maintenance emissions associated with transportation infrastructure. And we have a separate research project at Federal Highway Administration to develop a tool to do just that that should be released later this year.

So just to summarize what I covered, greenhouse gas emissions can be an important planning consideration when evaluating the transportation network. The handbook provides information to help you get started looking at the goal of the analysis, the data and tools and resources you have available and the variables you want to analyze. The handbook covers the available methodologies for analyzing greenhouse gas emissions starting from the simplest to the most complex. And the handbook provides detailed resources, documentation and examples to help you once you've decided on a methodology to figure out how to apply it in your area.

I should also point out that even though this is a greenhouse gas handbook, all of the methodologies and tools are also applicable to energy analysis. So if you are interested in the energy impacts of your transportation system, whether it's, you know, looking at the impacts of different alternatives on fuel consumption or fuel costs to people that are going to use the transportation system, you can also use the methods in this handbook to estimate energy impacts. In some cases, energy consumption is a direct output of the tools you'll be using. In other cases, it's sort of an intermediate product before you calculate emissions. But either way you can also use the methods in this handbook for energy analysis if you are interested in that.

And with that I'll turn it back to Diane -- or let's see if we have any questions on this material.

Jeff, we're not showing any questions in the chat pod right now. Okay. So we'll maybe have some questions at the end. Let's turn it over now to Rich Perrin who is going to give us an MPO perspective.

Great, thank you very much, Diane. I'm waiting for my presentation to load up here. It's entitled integrating the GHG analysis into the transportation planning perspective and it's a metropolitan planning organization perspective but I think it's probably important to note in the development of the guidebook there were other openness including Atlanta, Oklahoma City, Dallas, San Luis Obispo and Washington, D.C. And it was really great to hear what everybody was doing because there was a -- I think a good deal of variation not so much in the methodology but what it was being used for. So I think that the important part is that MPOs as Diane mentioned may clues to use this as a means for looking into how they want to handle sustainability, what they want to use for opportunities to start maybe bringing in some different stakeholders and be able to say that they are addressing those needs. Just very quickly by way of background, the Genese transportation council was actually formed in the '70s and as such it really doesn't necessarily have boundaries that relate to if an MPO is formed today which is to say we have a lot of rural area included in our planning boundaries and so what that means is, it's pretty large. It's about 4700 square miles the region, 1.2 million people around 30,000 businesses and about 540 to 550,000 jobs. The only reason I bring that is up because it's incredibly diverse. We have, you know, Mennonite populations mixed with the state. How we approach integrating greenhouse gas gas analysis into the planning process and then ultimately into the capital investment or the programming process came a little differently and what I mean by that was New York State adopted an energy plan in 2002 and then they since did an update in 2009 and there's another one forthcoming this year. But as part of that energy plan, it also included carbon dioxide emissions. So greenhouse gases were all of a sudden there. And what ended up happening was the New York State Department of Transportation or NYSDOT along with the MPOs

developed a methodology for quantifying energy and CO2 emissions from on-road sources. In addition to that, that being the direct energy component of it, there was also the indirect energy component of it which was basically what it took to construct and maintain our facilities our structures and pavements. But it was really energy was that initial impetus so we did our first energy and greenhouse gas analysis in 2003 as part of our -- part of all our subsequent long range plans and tips capital improvement programs since. Since then we have really started to move into the associated metrics for both performance monitoring as it relates to seeing how we're moving over time in specific areas as it relates to what we say we want to accomplish in our long-range plan and how do we tie that back directly to the programming process and the transportation improvement program or TIP. So I'm going to discuss a little more on that later in the presentation. But one of the things that we have tried to do since the beginning is recognize that this is an evolving process in terms of the analytical capabilities so we want to center this commitment to continuous improvement. And so what we first started with is a lot different but we have always because of our travel demand model been able to use the VMT-based method. This last time around, we actually customized it with local inputs for MOVES 2010b. We don't do conformity anymore. We're a 1997 ground level ozone nonattainment area but we meet the newest [indiscernible] So whenever there's a switchover in the implementation -- we have got the past for conformity for the last long range plan or I should say for our last TIP only. I think what's important to note was even though we didn't have it make the move, no pun intended, to MOVES we did because we thought it did provide that more robust analytical capabilities.

As we started to move into this, though, I really would say that as being part of the guidebook there were three areas and Diane highlighted these, that we looked at and said, this is what we use our estimation of GHGs in the planning process for. The very first one is really as it relates to our long-range plan. I went by it a little bit. There's four components there and I'll run through each one briefly. But these were major developments phases as part of the long-range plans once we got by what the federal requirements were and what power guiding principles would be to make that relevant to the region. We started to say, okay, we don't do transportation for transportation sake so what have some of the emerging opportunities and issues that we're going to have to address or that we feel are going to be critical over the next 25 years in our case almost 25 years? So you can see that the second one from the bottom was this idea of the impacts of climate change, and we wanted to look at both mitigation and adaptation. And clearly when it talks about missions analysis, you're talking about mitigation. We didn't necessarily have agreement on what are the manmade impacts o climate change. Let's focus on the things we agree on. And the next one was somewhat related to it this idea that we don't know what our future energy requirements are. We made a pretty conscious decision to say that personal vehicles will still play a role for the foreseeable future and even beyond. But there's a great amount of uncertainty regarding what the future vehicle power sources will be. We also in our region were looking at what would be the potential impacts on structures and pavements and bridges and highways if hydrofracking is approved. But even so, as part of this last one, what will the impacts be on GHG emissions? It's not something that over 25 years we necessarily tried to quantify. We just said we probably will begin to see the shift away from the monopoly of a single fuel source oil to different fuel sources and that will likely have an impact. So when we started talking about what our projection would be, not our estimation of current but our projections of future GHGs, this is an important consideration. So one of the things I mentioned was that we have this very diverse region. But I don't know how well this is showing up, it's not as if you need to read everything on this slide, but one of our guiding principles, we don't treat highways and bridges like the customers, the second one was place matters. The idea that we have that diverse region of rural, suburban, urban, even inside some of the rural areas are villages very dense settings. They all have similar transportation needs. But how those needs are prioritized within the process for basically implementation is going to vary by what matters. And the one thing we said though as you can, there's a few things that are always the major need in the dark blue. The first one on the left which is obviously increasing safety for all users, and preserving and maintaining our infrastructure and services. But the last one was really this idea reducing direct and indirect energy use. We didn't come right out and say emissions of greenhouse gases or ozone precursors or lead or particulates. If we reduce usage those things come with it. What will our transportation strategies be for doing that? That was really a function of our recommendation. So when we got into this preservation and maintenance were the biggies. Now, we're projecting those would have about 85% of our federal funds and available state and local funds over the life of the plan. How do we use what we have better so we don't have to add more asphalt and concrete? If we do it's got to be limited and really still only about operational improvements. What are the impacts on delay and VMT and GHG emissions as a result? We also included travel demand in there as well and technology being primarily our intelligent transportation systems efforts and coordination being that we could have all sorts of inter operation and integrated corridors but it comes down to people and working together. You can see under expansion, we basically left

this to three things. None of it was highways. It is expanding our active transportation opportunities by bicycle and pedestrian to another degree public transportation, where financially possible expanding public transportation service or increasing the frequency. And then where we can continuing to make investments and improve vehicle options.

And so from there, the plan also included performance measures and I think the key here and this really leads into that second point of what the handbook said was available which is, you know, addressing sustainability within performance-based planning, we had performance measures for the plan. We had desired and likely changes. They are not quite targets. They are really not. But we still needed to at least project to say here's what we think will happen versus what we would like to happen. And as we started going into this, this was really the crux for how do we begin to move towards a completely performance-based planning process? The idea being is let's work towards, I know, rather than, I think. So these are some of what we tried to do in terms of our long-range plan performance measures recognizing they would guide the investment decision-making process.

Under the third goal and it's interesting, we said, well, we want to use real world data instead of model data to the extent possible. Well, guess what the only performance measures are that we don't have quote, unquote real world data for? The environmental ones including energy usage and GHG emissions and obviously there's a reason for that. We don't have monitors. These things aren't coming to us directly from a system of where we have everybody's tailpipes, you know, processing for us or anything like that. But we worked with member agencies that we knew we wanted to make sure that the consistency was there. The key was that greenhouse gas emissions may not be a priority for them as a individual, but they all agree that there was value to having it at the regional level and so once we got that consensus and said we will pick outcome-based measure as opposed to activity-based, it wasn't about did we or didn't we do something, it's what is the impact on our customers, the traveling public? We defined it and tried to use real word data as much as possible. We cut the number of what we were working with I think very minimal for a specific reason and that's when we started looking at all the metrics we could possibly consider they were huge. We wanted things that were both meaningful and comprehendible. As transportation professionals, we felt like we could have something that would be very meaningful but would policymakers and the public get it? And we didn't think they would in some cases so we tried to keep this to what we thought was reasonable.

We also decided energy has to stay in the mix. Bee moved it down after carbon dioxide equivalent. If you remember we started this as a result of an energy plan directive but we said, no, energy stays in the mix. We still do our nitrogen oxides and volatile organic compounds as an ozone nonattainment area but at the end of the day the attention we got from stakeholders comes down to the carbon dioxide equivalence. So we also moved this into our selection process for projects through the TIP and the biggie on the first bullet was we selected project evaluation criteria that were directly linked to the performance measure. So when we started looking at this, we said, highway do we tie this directly back to our performance measures including the ones for greenhouse gases or CO2 equivalent and energy usage? Then we really worked through to make sure are we asking the right questions? Not only in our application package and the proposal form that agencies would fill out and submit to us, but also since we offer them the opportunities for presentations asking them questions. In a lot of cases, we're in that preservation and maintenance mode GHG didn't even come up. It was okay. You're going to do preventative maintenance to get another 15 years of useful life out of this bridge or highway, okay, we can look at that a little bit separately.

We produced a rater's guide. For the criteria that related to the environment, one being GHG and energy, we needed to have consistency so not only among the raiders but across updates. So when we do this TIP update again this summer and fall and winter as we move forward beginning in late August we want to make sure we are consistent so if we have to make changes, we can compare projects across the development of the capital program.

We used information contained in a USDOT department from 2010 called transportation's role in reducing US GHG emissions. It provided a lot of great information on what the likely impact would be of various strategies so we weren't doing a lot of planning sketches. We were doing here's the effect from this type of strategy.

Assessing 10 years of experience, so we started to look at that as well for how we could do this.

Very quickly, to wrap up, we have also started on that third area we started to support the state and local climate action planning efforts. Big one for us was the New York State energy research an development authority's cleaner greener

communities program. And really, this authority is also the one that develops the energy plan. But they had just a tremendous amount of community outreach and involvement. I would love to have the type of out reach and impact that they had on this plan for one of our long-range plans but it was completed just this last spring addressed transportation greenhouse gases emissions. We were on the Executive Committee and Steering Committee but one of our big things was to look at how they were doing their on-road GHG emissions. We were darn close with what they had and they were darn close what what we had. There were some very minimal I would say differences. And this allowed us to assess what the transportation and land use alternatives that were proposed were and what ultimately made it into the plan. So that was again covering the same region as our long-range every range plan. Most recently, though, the city of Rochester is now taking on an energy master plan by another New York State authority the Power Authority doing it in five cities in Upstate New York which is basically outside of the New York City area. One is a transportation energy efficiency component. That's one of their principal areas of impact key result areas. And one of the things that we were able to look at was, okay, we can take our methodology and do it for a smaller area to look at just what the on-road GHG emissions are within the city limits. So that now allows them to consider how they want to move forward and we're there to ensure consistency with the metropolitan planning process for transportation.

Lastly, our next steps, we're always looking to improve and expand our capabilities. There's no doubt about it. I mean, that really relates to all of the things you're seeing right there. There's multiple benefits to having a good travel demand modem. The MOVES 2010b we had a series of localized inputs we did including things like the vehicle types, we used post processing of speeds so that we could do a little more refined analysis there. We also as the guidebook -- as was mentioned in the previous presentation, we want to see how we can assess those system and demand imaginement strategies because they are such a key component of our long-range plan and we now need to update the indirect energy estimation factors the ones we were using are very old. So we want to find new ones and make sure we are taking that holistsic look not just the use of the system but what it takes to construction it and then we're continuing our planning initiatives that include significant climate change components. Obviously, the system management and operations, but we're funding a lot of community wide bicycle and pedestrian plans. We have a bike sharing feasibility study we are starting an update to our regional trails initiative. In terms of end grating transportation and land use New York is a home rule state so the municipalities, the towns, cities, villages have control over land use. Our board is going to consider accepting a guidebook that provides information and examples on transportation related zoning ordinances and incentives, programs and model plans for local governments to consider how they can start to look at GHG emissions from the land use demand side. And then from an infrastructure resiliancy this is adaptation but we have now started to move forward with finding a consultant for a critical infrastructure vulnerability assessment and on the clean vehicle technology and fuels we work closely with the Genesee region clean communities or clean cities coalition which is the Department of Energy sponsored initiative and even on the programming side we provided C-Mac funds for a clean fuel program that they are undertaking.

So there's a lot of use and benefits to being able to do that quantification of what we estimated GHG emissions to be. Again when we started, it was just CO2 and now it's no2, also methane that we're able to incorporate to get a more complete picture. And from there, we move from that we think to we know, basis for making decisions as it relates to how we want to incorporate climate change with all of those other transportation needs like mobility and safety and access. So that's our story. I guess I'm sticking to it. But it was a lot of fun to get to develop this guidebook because like I said, the state DOTs and the other MPOs that were there provided us a lot of good ideas to take back. So with that, I'll wrap it up.

Thank you very much. We have one question in our chat pod looking for a link to explain how greenhouse gasses are used in the TIP process. Do they go to your main website for that or somewhere specific?

I can check. If not, what I can do is rob and I have done a couple of things to do. I have his email address. I can send the link -- I don't know that we have a link. I think the application package might be there but if he wants the whole package like the rater's guide and things like that it might be something -- definitely something we can post and send along:

That's great, thank you. That was an excellent overview of your climate change effort at your MPOs so we thank you very much for your time.

Thank you.

Now we are going to turn it over to John Davies who is it going to talk about some of the other Federal Highway tools in the greenhouse gas analysis effort.

Great. Thanks so much, Diane. Again, I'm John Davies with FHWA's office of natural environment in Washington, D.C. I wanted to talk about a few projects that FHWA's recently developed or is in the process of developing to support transportation agencies GHG analysis. I think we have alluded to a few of these earlier and wanted to go into a little more detail.

In the next slide, three in particular I'd like to talk about today. First is sort of a handbook that in some ways is a cousin to the resource that Jeff introduced us to. And also it's in many ways connected to the sort of performance-based analysis that Rich was describing earlier. So this is a performance-based greenhouse gas analysis handbook. We'll talk about that. The second project is a construction and Mains nance greenhouse gas calculator and I think that Jeff mentioned that earlier. And also Jeff mentioned the EERPAT tool.

Next slide couple of quick words about performance-based greenhouse gas analysis handbook. This is something that we'll be posting very shortly on the Web. So again, this is something that relates to GHG analysis techniques and sort of performance-based approaches that are being ensconced in planning practice. So the handbook, you know, addresses, I guess, a number of, you know, uhm, you know, issues that are in some ways surprisingly, uhm, challenging to -- to address, you know, how do you select the right performance measure based on, you know, the particular sort of interest you might have in, uhm, in -- in, uhm, greenhouse gas considerations, uhm, you know, Rich was talking about the, you know, very large number of metrics uhm that his organization was considering and, uhm, and -- and this handbook talks about, you know, how a particular, uhm, measure can be, you know, selected to sort of serve -- sort of -- sort of -- matching analytic purpose.

The document also talks about, you know, how you can really evaluate, you know, performances with respect to greenhouse gas emissions. Recognizing there's lots of things that ultimately influence, you know, GHG output and so this is, you know, it discusses ways that you can actually, you know, evaluate ways that, you know, particular plans or specific projects are ultimately, uhm, you know, influencing, you know, either current or future GHG output.

And then, you know, finally, the question that we have been -- that I think Rob was asking about and that Rich was alluding to really how, you know, this kind of information can ultimately inform, you know, investment choices and decision-making and there are a few examples that are provided that again in the document.

So the next slide we talk about construction and maintenance GHG calculator. Again, a topic that both Jeff and Rich referenced earlier. I think this is, you know, really unfortunately and often overlooked area and one that I think is, you know, valuable for some number of reasons. You know, construction and maintenance emissions first of all I think we would see as a nontrivial source of emissions. And evaluating those emissions is important because it helps us understand whether, you know, ultimately, you know, projects are -- when you account for, you know, the infrastructure related emissions ultimately leading to greenhouse gas emissions reductions or, you know, if they are leading to reductions, you know, what the time is to achieve those reductions, it's important, you know, topics that -- a third reason is, uhm, that, you know, there exists -- go back to the previous slide, please -- that, you know, there exists opportunity to improve practice and then, you know, sort of a fourth reason is -- I don't know if we really talked about this today, but [indiscernible] Issued a draft guidance on, you know, addressing the greenhouse gas emissions that are associated with the federal actions and there exists a very real possibility that construction-related emissions could be considered, you know, a sort of a class emissions that might need to be addressed under the CEQ guidance. It's all to say that there don't exist a whole lot of tools to really evaluate emissions especially using the kinds of information that you would have early in the process, you know, the pre-engineering level and [indiscernible] For this project was developed a fairly simple tool that would have, you know, information that would be available to planners and NEPA analysts and that could, you know, generate sort of, you know, sketch level order of magnitude emissions estimates you know, for plans and projects.

The next slide shows a little screen shot of a portion of the main input page and maybe a little bit difficult to see. I

don't know if we have a pointer here but there really are, you know, a couple of sort of key pieces of information that would be entered. One of the basically the kinds of, you know, actions that you would take that are related to construction and maintenance and then the second is the -- that's identified -- if you can see it under this -- the columns that we're identifying as project type. And then on the other hand, there's a particular sort of facilities you would be taking these actions on so basically what you do in this tool is you enter the, for instance, the number of lane miles of, you know, particular actions that would be taking on particular types of roadways. For instance, you know, an analyst would be able to enter -- anticipating that there will be -- their plan might involve the creation of 100 new lane miles on, you know, rural interstates and the calculator in the background generates estimates of the associated materials that would go into that particular action and then at the back end it generates estimates of, you know, the material and the sort of machinery, the construction equipment operation, that ultimately would allow that to happen so there's really a lot of information that exists within the calculator that supports these estimates.

And so this part of the calculator helps the user generate baseline estimates of a particular system or, you know, potentially a particular project.

The next slide shows another, you know, key objective of -- yes -- of -- of the tool which is, you know, to evaluate, uhm, the sort of emissions reduction potential of, you know, what you might see as green strategy. And so in the little schematic on the right, we have a variety of different mitigation strategies that are included in the tool. The tool provides a fairly [indiscernible] Simple drop-down menus in which users can indicate sort of whether or not they are doing these things. But it gets sort of an order of magnitude estimate of the reduction potential and the -- you know, sort of the -- -- how you would construct projects -- it starts a conversation about the kinds of things you could do to make practice a little bit greener.

The next slide describes the aforementioned energy and emissions reduction policy analysis tool, also known as EERPAT. This really is I think a very interesting model. It was actually pioneered by a modeler by the name of Brian gregor at the Oregon Department of Transportation who created the -- a predecessor called green step and essentially what green step and then this sort of successor version EERPAT represent is a combination of travel model and emissions model. And the travel model piece basically tries to address some of the sort of key functionalities that allow you to address lots of sort of -- well, I guess a whole range of mitigation-related strategies many of which, you know, are sort of small scale and not easily addressed through, you know, conventional travel models. And so there's a lot of sort of functionality that spills into this. Rather than having to run a, you know, a say a regional model and then, you know, separately run an emissions model like MOVES, you have within this particular system an ability to to, you know, in a single run that might take say an hour or two, you are able to generate an entire scenario so the idea is that this can, you know, provide a screening tool if you are interested in addressing, you know, lots of different sort of combinations of strategies and if you are interested in -- if you want to figure out what you need to do to hit a target you can figure out what kind of strategies would help you get there. So the link at the bottom of the page there references the location of the model on FHWA's site. We're currently working to compile -- make some refinements to the model.

The next slide talks about the kinds of mitigation strategies that are addressed beat model. Again, these are all the kinds of mitigation strategies that people are interested in. Again, these are not all strategies that are necessarily easily addressed by conventional models. The idea is that EERPAT represents another way to get sort of high level estimates of the sort of magnitude of emission reductions at various times of these strategies can achieve -- and I guess also an important sort of aspect of this is the ability to address, you know, a kind of a challenging question of, you know, what interactions exist among these strategies.

Next slide, you know, provides one particular policy example that gives an illustration of the application of EERPAT to address a couple of different land use scenarios and to get a sense of the emissions reductions that are associated with, I guess, with -- with a base case and two alternatives there.

Next slide, again, I had mentioned that the pilot testing that FHWA is doing, we're working with four pilot locations to essentially develop their own versions of the model using local data and I guess testing sort of locally relevant policies and this is in some ways a further proof of concept to give us an idea of how well the model is able to respond to the kinds of policies that practitioners are interested in. And a second issue is really, you know, FHWA is interested in

making the model more usable so we are hoping to draw on the experience again of practitioners to come up with a tool that will be, you know, easier for those who are interested in full implementation. That's about it. The contact information for Diane and me is on the final slide. So I think that's about it, I guess time for some questions.

Yes, John. Thank you.

Don't forget if you have any questions to type them in the chat pod. Let's open up the phone lines for questions.

Ladies and gentlemen, if you would wish to ask a question, please press star 1 on your touch-tone phone. You will hear a tone indicating you've been placed in queue. You may remove yourself from queue at any time by pressing star 2. If you are using a speaker phone please pick up the handset before pressing the digits. Once again, please press star 1 at this time. Again, that is star 1.

[Pause] We have no questions over the phone lines at this time.

Okay. We have a quiet crowd out there today. Well, I don't know if anyone else has anything else they would like to say. If not, and if we have no more questions on the phone or the chat line, I would like to thank everyone for participating today. And if you have any questions, please feel free to give John or me a call and we'll be happy to help you out. Have a great day.

Thanks, everyone.

Thank you.

Thank you.

[Event Concluded]

That does conclude our conference for today. Thank you for participation p and for using AT&T teleconference service. You may now disconnect.

[Event Concluded]